

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Cyanea eleeleensis*

COMMON NAME: Haha

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1997

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

- ___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- ___ N – Taxon does not meet the Act’s definition of “species.”
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Campanulaceae (Bellflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LAND OWNERSHIP:

This species was found only on private land.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Cyanea eleeleensis* is a shrub 1.8 meters (m) (6 feet (ft)) tall, with glabrous stems. Leaves are oblanceolate, 38.5 to 40.5 centimeters (cm) (15 to 16 inches (in)) long, 11.5 cm (4.5 in) wide, with the upper surface green and the lower surface pale green. The inflorescence is 11 to 20-flowered and densely short-pubescent. Calyx lobes are triangular, 4 to 5 millimeters (mm) (0.16 to 0.2 in) long, and 3 mm (0.12 in) wide. The corolla is bilabiate and tubed, 46 to 47 mm (1.8 to 1.9 in) long, purple with lighter longitudinal stripes, and a ventral lip cut to its middle into three linear lobes. Berries are subglobose, 12 mm (0.5 in) long, 14 mm (0.6 in) in diameter, purple, and crowned by persistent calyx lobes. Seeds are unknown (Lammers 1992).

Taxonomy *Cyanea eleeleensis* was originally described as a species of *Delissea* by St. John in 1987 (St. John 1987). In 1992, Lammers transferred this species to the genus *Cyanea* (Lammers 1992). This species is recognized as a distinct taxon in the supplement to the *Manual of the Flowering Plants of Hawaii* (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat *Cyanea eleeleensis* was known only from one location in Wainiha Valley, Kauai, where it was found growing in a shaded gulch in wet forest at an elevation of 213 m (699 ft) (Hawaii Natural Heritage Program Database 2004; Lammers 1992). We are unaware of unique attributes in this gulch that limit the distribution of this species to this location. Wet forest habitat is found in many parts of the island of Kauai.

Historical and Current Range/Current Status This species was discovered in 1977, and was only known from one population totaling less than 10 individuals in Wainiha Valley on Kauai (Lammers 1992; Steve Perlman, National Tropical Botanical Garden, pers. comm. 1996; K. Wood, pers. comm. 1997). Wet forest habitat is not uncommon on Kauai, and botanical surveys in wet forest habitat on Kauai have been conducted since *Cyanea eleeleensis* was discovered in 1977; however, this species has not been found in other surveyed areas. In a survey conducted in 2000 the last known individual was found dead, and a subsequent survey in 2001 also confirmed no living individuals of this species in the only known location (K. Wood, pers. comm. 2005). However, all potentially suitable habitat (wet forest) on Kauai has not been thoroughly surveyed.

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Pigs (*Sus scrofa*) were reported to threaten *Cyanea eleeleensis* (S. Perlman, pers. comm., 1996; Hawaii Division of Forestry and Wildlife 2006). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Kauai. The pig is originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs, introduced to Hawaii by Captain James Cook in 1778, became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. They are currently present on Kauai and four other islands, and inhabit rain forests, such as the wet forest habitat this species was found in, and grasslands. Feral pigs rooting in the ground to feed on invertebrates and plant material, disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these alien plants to establish. Pigs are a major vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Medeiros *et al.* 1986; Scott *et al.* 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner *et al.* 1999a) (also see “E” below)..

No known conservation measures have been implemented to date to address this threat in relation to *Cyanea eleeleensis*.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

Slugs eat the leaves and other parts of this plant (S. Perlman, pers. comm. 1996). The effect of slugs on the decline of this and related species is unclear, although slugs may have posed a threat

by feeding on the stems and fruit, thereby, reducing the vigor of the plants and limiting regeneration. Outplanted seedlings of the closely related genus *Clermontia* have been completely removed by slugs (Alvin Yoshinaga, University of Hawaii's Lyon Arboretum, pers. comm. 1995).

Rats are known to eat other members of this genus and may have been a threat to this species (S. Perlman, pers. comm. 1996). Of the four species of rodents that have been introduced to the Hawaiian Islands, the species with the greatest impact on the native flora and fauna is probably *Rattus rattus* (black or roof rat), which now occurs on all the main Hawaiian Islands, including Kauai. Black rats, and to a lesser extent *Mus musculus* (house mouse), *R. exulans* (Polynesian rat), and *R. norvegicus* (Norway rat), eat the fruits of some native plants, especially those with large, fleshy fruits. Black rats strip bark from some native plants, and eat the fleshy stems and fruits of plants in the bellflower and African violet families (Tomich 1986; Cuddihy and Stone 1990; Joel Lau, The Nature Conservancy, pers. comm. 1994). Rat damage to the stems of species of *Cyanea* has been reported in the wet forests of Kauai. *Cyanea eleeleensis* occurred in a very remote and inaccessible area that was infrequently visited, so rat damage had not been directly observed on this species. However, several field botanists reported that rats ate fruits of this species (Loyal Mehrhoff, Service, *in litt.* 1994; Perlman, pers. comm. 1994).

Currently, no conservation actions have been implemented for these possible threats of predation on *Cyanea eleeleensis* by slugs or rodents. However, based on the available information, we can not tell for certain whether predation posed a threat to the species.

D. The inadequacy of existing regulatory mechanisms.

Pigs are managed in Hawaii as game animals but may populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers (Hawaii Heritage Program 1990). Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c). However, public hunting does not adequately control the number of pigs to eliminate this threat to *Cyanea eleeleensis*. No other known conservation measures had been implemented to date to address this threat.

E. Other natural or manmade factors affecting its continued existence.

Several alien plant species were a high and imminent threat to this species (S. Perlman, pers. comm. 1996). The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Cyanea eleeleensis*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or

altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to habitat of *Cyanea eleleensis*, the Service believes nonnative plant species probably were a threat to *Cyanea eleleensis*.

In addition, since it's discovery in 1977 this species had only been known from a small number of individuals in one location (K. Wood, pers. comm. 2006). Species like *Cyanea eleleensis* that are endemic to single small islands are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by genetic bottlenecks, random demographic fluctuations and localized catastrophes such as hurricanes.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

None known.

SUMMARY OF THREATS:

The major threats to this species included habitat destruction and modification, principally due to pigs. The impact of predation by rats and the effects of alien plant species also are likely to have contributed to the decline of this species throughout its range. Slugs may also have been a potential threat. No conservation efforts have been initiated to address the threats to the species.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: This species is highly threatened by pigs that degrade and destroy habitat, by rats and slugs that directly prey upon on it, and by nonnative plants that outcompete and displace it.

Threats to wet forest habitat of *Cyanea eleeleensis* occur throughout its range, and are expected to continue or increase without their control or eradication.

Imminence: Threats to *Cyanea eleeleensis* from pigs, rats, slugs, and nonnative plants are considered imminent because they are ongoing.

Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? yes

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Cyanea eleeleensis* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:

The information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995 and subsequently updated with information obtained by personal communications with Joel Lau of the Hawaii Natural Heritage Program in 1994, Alvin Yoshinaga of Lyon Arboretum in 1995, Steve Perlman of National Tropical Botanical Garden in 1996, Ken Wood of National Tropical Botanical Garden in 1997, and the taxonomic treatment of the species by Thomas Lammers, formerly with the Field Museum of Natural History and an expert in Hawaiian Campanulaceae (1992). We incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004 the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information, or updates to our then current information, was provided in 2004. In 2005 we contacted the species experts listed below and confirmation of the probable extinction of *Cyanea eleeleensis* was provided by Ken Wood, National Tropical Botanical Garden.

In the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Endangered (at risk of extinction) by Wagner *et al.* (1999b), but likely extirpated and possibly extinct.

COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	March 29, 2005	National Tropical Botanical Garden
9. Ken Wood*	Aug 2 & Apr 4, 2005	National Tropical Botanical Garden
10. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized:

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai'i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii Division of Forestry and Wildlife. 2006.

http://www.state.hi.us/dlnr/dofaw/cwes/files/Flora%20fact%20sheets/cya_ele%20plant%20NTBG_ok.pdf

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- Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. *Weed Technology* 18: 1472-1474.
- Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvenscens* DC (Melastomataceae) in the Hawaiian Islands. *Bishop Mus. Occas. Pap.* 48: 23-36.
- Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. *American Fern Journal* 82: 27-33.
- Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. *Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept.* 59:1-230.
- Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvenscens* D.C. (Melastomataceae). *Journal of Biogeography* 23: 775-781.
- Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. *Endangered Species Bulletin*. November/December.
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. *Studies in Avian Biology* 9: 1-429. Cooper Ornithological Society, Los Angeles.
- Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai'i. *Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park*, pp. 274-288.
- Smith, C.W. 1985. Impact of alien plants on Hawai'i's native biota: *in* Stone, C.P., and J.M. Scott (eds.), *Hawai'i's Terrestrial Ecosystems: Preservation and Management*. *Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu*, pp. 180-250.
- St. John, H. 1987. Diagnosis of *Delissea* species (Lobeliaceae) from Kauai: *Hawaii Plant Studies* 145. *Phytologia* 63: 339-349.
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- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. *Manual of the Flowering Plants of Hawai'i*. University of Hawaii Press and Bishop Museum Press, Honolulu. *Bishop Mus. Spec. Publ.* 97: 1-1918.
- Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. *Bishop Mus. Occas. Pap.* 60: 1-58.

- Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai'i, version 3.1. December 12, 2003. Available from the Internet. URL: <http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm>.
- Wenkam, R. 1969. Kauai and the Park Country of Hawaii. Sierra Club, San Francisco. 160 pp.
- Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005
Conducted by: Marie M. Brueggemann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 22, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 13, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 13, 2005
Field Supervisor